

# Mass Unattended Linux Installation

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## 1 Installing Linux

- Installing an operating system is usually fairly straightforward
  - Certainly for modern Linux distributions
- General procedure:
  - Boot the system from the install media
  - 'Handhold' the installation program, answering questions as appropriate
- Most distributions reduce the handholding phase as much as possible

## 2 Zero Interaction

- Handholding an installation is not always appropriate
- Many situations require a large set of identical or near-identical hosts:
  - Server farm (web serving, rendering, etc.)
  - Classroom laboratory in a university or school
  - Nodes in a Beowulf cluster
- Automating installation has many benefits:
  - Minimise effort
  - Reduce cost of adding or replacing equivalent hosts
  - Avoid mistakes and consequent loss of reliability

### 3 Obstacles

- Variety of obstacles to unattended installation
  - Not all apply in all situations
- Repeatable package selection
- Network configuration
- Hardware detection
- User accounts

### 4 Characteristics of a Solution

- Not an auto-installer *per se*, but an auto-install builder
  - Different situations require slightly different solutions
- Might need several distinct automated installs
- Often need support from the operating system vendor
  - Especially for hardware detection/configuration and package selection
- Many generic system-administration tools are helpful:
  - DHCP to control network configuration
  - Centralised site-wide user account management

### 5 Auto-Installation Tools

- Most operating systems have auto-installation tools
- KickStart for Red Hat
- ALICE for SuSE
- Three for Debian: FAI, Progeny auto-installer, Replicator
- SystemImager works with a variety of Linux distributions
- Non-Linux systems as well:
  - JumpStart for Solaris
  - RoboInst for Irix
  - Ignite-UX for HP-UX
- Relatively few differences between their approaches

## 6 Installation Method

- Two basic techniques
- 'Golden image':
  - Keep a disk image from a perfect installation
  - Some systems insist that you keep an untouched, unused 'golden host'
  - Usually offers extremely fast installation
- Automated full install:
  - The installer performs the same steps as full installation
  - Better suited to situations with varying hardware

## 7 Boot and Install Media

- Variety of boot and install media used
- PXE a good choice for booting in many environments
  - Modern systems support PXE network booting out of the box
- CD/DVD or floppy if network booting isn't appropriate
- Where does the installed software come from?
  - CD/DVD, NFS, HTTP/FTP, rsync, ...

## 8 Configuration Differences

- Two relevant cases:
  - Distinct use patterns for different groups of auto-installed machines
  - Different hardware within one group
- Two main ways to select a usage pattern:
  - Make the admin specify when starting the install
  - Tie configuration data to the machine's MAC address
- Handling hardware differences:
  - Choosing by usage pattern might work
  - Hardware detection (like a manual installation)

## 9 Case Study: GBdirect

- GBdirect Ltd: consultancy, bespoke software development, technical training
- Enormous rise in volume of training
- Cost of delivery increasingly an issue
- Existing procedures somewhat *ad hoc* and unreliable
- Decision to create a mobile training suite:
  - Custom-built flight case
  - Set of laptops with all software needed for any course
  - Students change things — reinstall after every course

## 10 Unusual Requirements

- Change installed software comparatively frequently
- Reinstall in remote locations, without internet access
  - Use CD/DVD for both boot and software
- No server to support installed systems
  - Can't use DHCP or centralised user accounts
- Provide user environment suitable for customers with no Linux experience
- Laptop hardware can cause problems
  - No built-in Ethernet cards on some machines
  - PCMCIA poorly supported by many auto-install tools

## 11 Approach to a Solution

- Considerable in-house Debian expertise
  - Building packages an option, unlike for other distributions
  - Non-Debian choice sensible for us only if Debian can't do the job
- Progeny auto-install supports single-CD operation
  - Also permits network operation where available
- Some configuration (host names, etc.) tied to MAC address
  - Choose matching inventory numbers for laptops and PCMCIA Ethernet cards — simplifies administration

## 12 Problems Encountered

- Installation based on Debian 3.0 'Woody'
  - Incomplete support for unattended installation
  - Needed to rebuild a few critical packages to avoid interaction
  - Forthcoming 'Sarge' release almost certainly won't need this step
- Progeny auto-install didn't seem to handle PCMCIA well
  - Use a 2.4-series kernel, with large build
  - Mysterious problems with modules, so everything compiled in
  - No direct support for 2.8Mb-floppy boot image
- No `ext3` support — convert after install

## 13 Current State

- Reasonably fast
  - Install a laptop in 30 to 45 minutes (depending on hardware)
  - Install a whole suite in less than an hour if need be
- Security updates fairly straightforward
- Simple, powerful method for post-install actions
- Successfully coped with changing requirements:
  - USB floppy drive for floppy-free laptops
  - Wireless Ethernet to let students share data
- Reliable production use for over a year